SNAP HIGH-DENSITY DIGITAL MODULE USER'S GUIDE

SNAP-IAC-16
SNAP-IAC-A-16
SNAP-IDC-16
SNAP-IDC-32
SNAP-ODC-32-SRC
SNAP-ODC-32-SNK

Form 1547-070720—July, 2007

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SNAP High-Density Digital Module User's Guide

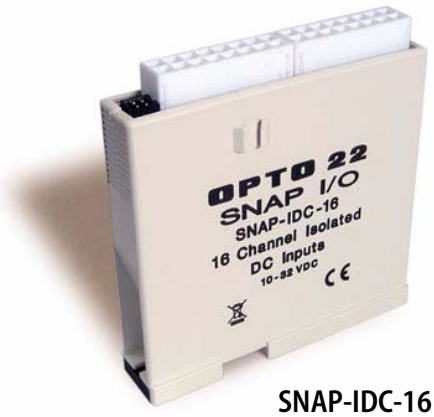
Introduction

SNAP high-density digital modules from Opto 22 provide 16 or 32 channels (also referred to as *points*) on one compact SNAP input or output module.

These modules are ideal for OEMs and others who have applications with high point counts, or for any application requiring a large number of digital points on one SNAP I/O rack.

The following high-density digital modules are available:

- The **SNAP-IDC-32** digital input module, with 32 input points, can be used to sense on/off status for 10–32 VDC inputs from sources such as proximity switches, limit switches, push buttons, and pilot switches.
- The **SNAP-IDC-16** digital input module offers 16 points with channel-to-channel isolation. It can sense on/off status for10–32 VDC/VAC loads.
- **SNAP-IAC-16** and **SNAP-IAC-A-16** digital input modules each have 16 points with channel-to-channel isolation. These modules sense on/off status for 90–140 VAC (SNAP-IAC-16) or180–280 VAC (SNAP-IAC-A-16).
- **SNAP-ODC-32-SRC** and **SNAP-ODC-32-SNK** digital output modules have 32 points and can switch on and off 5–60 VDC loads, either sourcing or sinking.



SNAP-IDC-16

SNAP-ODC-32-SNK

Hardware Compatibility

SNAP high-density digital (HDD) modules are part of the SNAP PAC System. They are designed to mount on a SNAP PAC rack with a SNAP PAC brain or R-series controller. Analog, serial, special-purpose, and 4-channel digital modules can be mounted on the same rack to provide the mix of signals and density needed at any distributed location.

(For information on using HDD modules with older processors or racks, see "Notes on Legacy Hardware and Software" on page 19.)

Field Wiring

Two options are available separately for connecting field wiring to the module:

- **Wiring harness assembly** with flying leads (32- and 16-channel modules). Use the **SNAP-HD-CBF6** for 32-channel modules and the **SNAP-HD-ACF6** for 16-channel modules. The wiring harness plugs into connectors on the module's top. Use one wiring harness per module.
- **Breakout racks and cables** (32-channel modules only). Fused breakout racks are also available separately to make wiring easier. **SNAP-IDC-HDB** is for input modules, and **SNAP-ODC-HDB** is for output modules. Use one rack per module. Connect the 32-channel module to either breakout rack using the **SNAP-HD-BF6** header cable.

Interface Terminal for HDD Modules

The optional **OptoTerminal-G20** operator interface terminal (available separately) is recommended for commissioning and troubleshooting. It plugs into a connector on the top of the module. The OptoTerminal-G20 displays the status of a high-density digital module's points on a two-line LCD display and can also be used to turn output points on and off.

What's in this Guide?

This guide includes the following sections:

- Installation and testing
- Comparison with 4-channel SNAP digital modules
- Specifications and dimensions

For Help

If you have problems and cannot find the help you need in this guide or on our website, contact Opto 22 Product Support.

Phone: 800-TEK-OPTO (835-6786)
951-695-3080
(Hours are Monday through Friday, 7 a.m. to 5 p.m. Pacific Time)

Fax: 951-695-3017

Email: support@opto22.com

Opto 22 website: www.opto22.com

NOTE: Email messages and phone calls to Opto 22 Product Support are grouped together and answered in the order received.

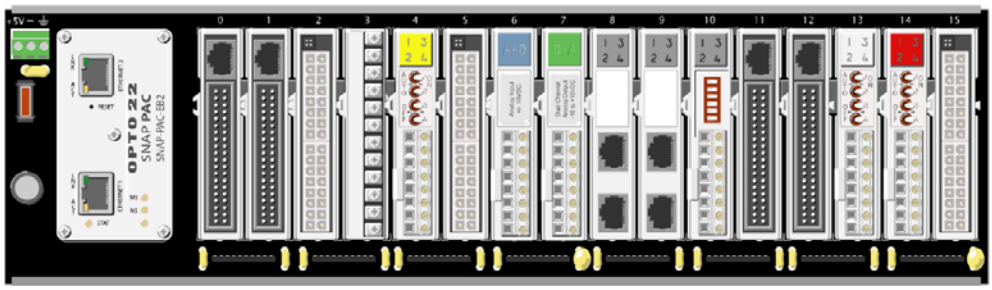
When calling for technical support, be prepared to provide the following information about your system to the Product Support engineer:

- Software and version being used
- PC configuration (type of processor, speed, memory, and operating system)
- A complete description of your hardware and operating systems, including:
  - loader and firmware versions for the processor (available through PAC Manager)
  - IP addresses and subnet masks for devices on the system
  - type of power supply
  - third-party devices installed (for example, barcode readers)
- Specific error messages seen

Installing Modules

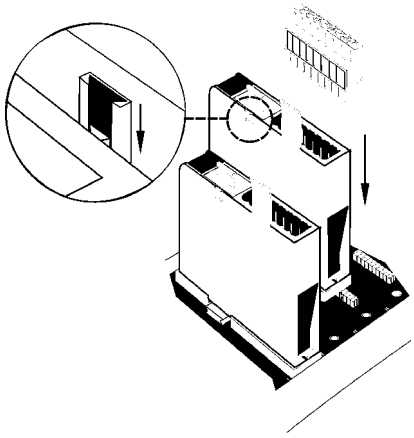
As shown below, high-density digital (HDD) modules can be mixed with other modules and placed in any position on a SNAP PAC rack. (For information on using HDD modules with other Opto 22 mounting racks, see "Notes on Legacy Hardware and Software" on page 19.)

SNAP high-density digital modules can be mixed on the rack with SNAP 4-channel digital, analog, and serial



Follow these steps to install modules:

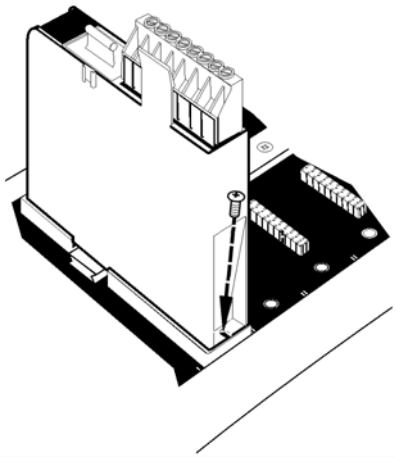
1. Turn off power to the rack.
2. Remove the module from its packaging.
3. Position the module over the connector on the rack, aligning the small slot at the base of the module with the retention bar on the rack. If it is next to another module, make sure the male and female module keys are aligned, as shown at right.



4. Push straight down on the module to snap it into position.

   The module snaps securely into place and requires a special tool (provided) to remove it. To remove a module, see below.

5. (Optional) As shown at right, use standard 4-40 x 1/4 truss-head Phillips hold-down screws to secure both sides of each module.

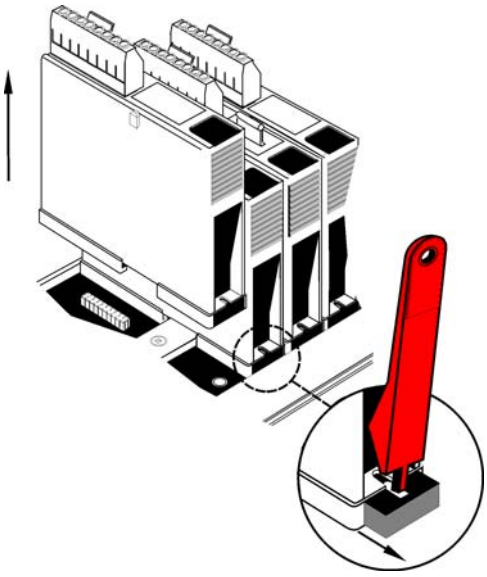


   CAUTION: *Do not over-tighten screws.*

6. Continue with "Attaching the Wiring Harness" on page 5.

Removing Modules

1. If the modules are held in place with screws, remove them.
2. As shown in the illustration, insert the SNAP module tool (provided) into the notch at the base of the module.
3. Squeeze the module tool against the module to open the release latch, and pull straight up on the module to remove it.



Attaching the Wiring Harness

A wiring harness assembly (SNAP-HD-ACF6 for 16-channel modules or SNAP-HD-CBF6 for 32-channel modules) is sold separately and used to wire field devices to the module. One wiring harness assembly is needed per module.

NOTE: Opto 22 also offers SNAP-IDC-HDB and SNAP-ODC-HDB fused breakout racks for 32-channel digital modules. If you are using a breakout rack, see "Configuring Breakout Racks" on page 11 for installation instructions.

1. Plug the wiring harness into the wiring connector(s) on the top of the module. Secure the harness cable so that its weight is supported. The connector plug is not designed to support the weight of the cable.
2. (Recommended) Install a barrier strip in a convenient location for ease in wiring the connector to field devices.
3. To wire field devices to the module, do the following:
   - For 16-channel modules, follow "16-Channel Module Connector Wiring for the SNAP-HD-ACF6 harness" on page 6 and "Pinouts—16-Channel Digital Input Modules" on page 8.
   - For 32-channel input modules, follow "32-Channel Module Connector Wiring for the SNAP-HD-CBF6 Harness" on page 7 and "Pinouts—32-Channel Digital Input Modules" on page 9.
   - For 32-channel output modules, follow wiring and fusing diagrams in "32-Channel Module Connector Wiring for the SNAP-HD-CBF6 Harness" on page 7 and "Pinouts—32-Channel Digital Output Modules" on page 10.

   ***CAUTION:** For output modules, you **must install fuses** between the wiring harness and field devices. If you use a fused breakout rack (part number SNAP-ODC-HDB), fusing is already done for you. If not, follow the diagram on page 10 to either fuse the common for each set of wires or fuse individual pinouts for each point.*

Building Your Own Wiring Harness

If you want to build your own wiring harness you will need the parts listed below.

For SNAP-HD-ACF6:

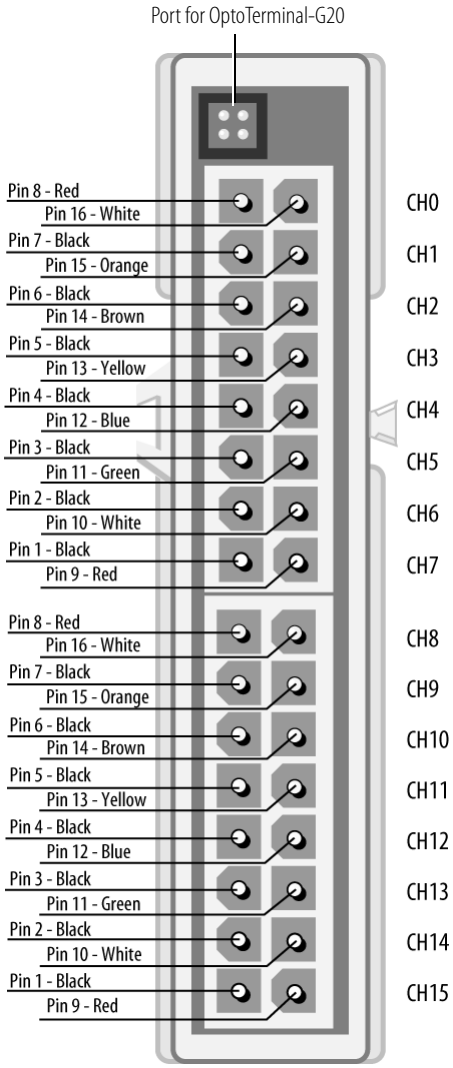
Connector: Molex 39-01-2165
Pins: Molex 39-00-0214
Cable: Belden 8308 (22 AWG, 16 conductor, shielded) or equivalent (UL AWM style 2464)

For SNAP-HD-CBF6:

Connector: Molex 15-04-5401
Pin housing: Molex 50-57-9320
Pins: Molex p/n 16-02-0103
Cable: Alpha 5020/40c (24 AWG, 40 conductor) or equivalent (UL type CM)

16-Channel Module Connector Wiring for the SNAP-HD-ACF6 harness

The following diagram shows16-channel module connector wiring for the SNAP-HD-ACF6 wiring harness. Note that the small four-pin connector on the top of the 16-channel module connects to the optional OptoTerminal-G20 using a special adapter cable, included with the OptoTerminal.



32-Channel Module Connector Wiring for the SNAP-HD-CBF6 Harness

The following table shows 32-channel module connector wiring for the SNAP-HD-CBF6 wiring harness. Wires from the wiring harness are grouped into four sets. Each set contains color-coded wires.

Set A		
Wires		Ch
A0	Gray	0
A1	Blue	1
A2	Yellow	2
A3	Red	3
A4	White	4
A5	Violet	5
A6	Green	6
A7	Orange	7

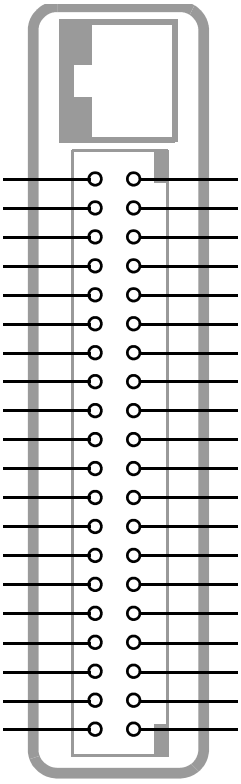
Set B		
Wires		Point
B0	Gray	8
B1	Blue	9
B2	Yellow	10
B3	Red	11
B4	White	12
B5	Violet	13
B6	Green	14
B7	Orange	15

Set C		
Wires		Point
C0	Gray	16
C1	Blue	17
C2	Yellow	18
C3	Red	19
C4	White	20
C5	Violet	21
C6	Green	22
C7	Orange	23

Set D		
Wires		Ch
D0	Gray	24
D1	Blue	25
D2	Yellow	26
D3	Red	27
D4	White	28
D5	Violet	29
D6	Green	30
D7	Orange	31

The four sets relate to point numbers on the module as shown below. For a pinout diagram of the input modules, see page 9. For output modules, see page 10.

Harness Wire Color	Pin Number	Signal
Gray	40	A0
Blue	38	A1
Yellow	36	A2
Red	34	A3
Black	32	ACOM
Gray	30	B0
Blue	28	B1
Yellow	26	B2
Red	24	B3
Black	22	BCOM
Gray	20	C0
Blue	18	C1
Yellow	16	C2
Red	14	C3
Black	12	CCOM
Gray	10	D0
Blue	8	D1
Yellow	6	D2
Red	4	D3
Black	2	DCOM



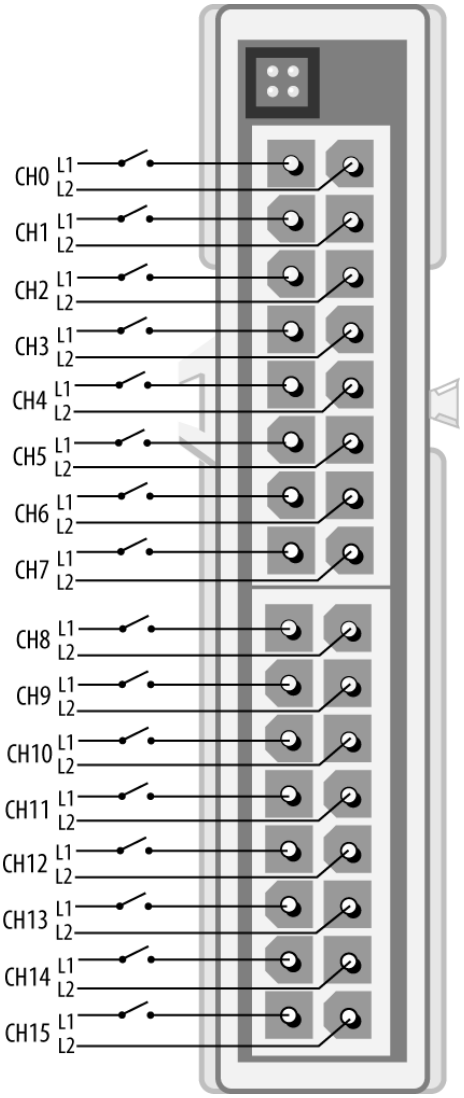
Signal	Pin Number	Harness Wire Color
A4	39	White
A5	37	Violet
A6	35	Green
A7	33	Orange
ACOM	31	Brown
B4	29	White
B5	27	Violet
B6	25	Green
B7	23	Orange
BCOM	21	Brown
C4	19	White
C5	17	Violet
C6	15	Green
C7	13	Orange
CCOM	11	Brown
D4	9	White
D5	7	Violet
D6	5	Green
D7	3	Orange
DCOM	1	Brown

Connector wiring for SNAP-ODC-32-SNK, SNAP-ODC-32-SRC, and SNAP-IDC-32 high-density digital modules (top view of module)

Module Connector Pinouts

Pinouts—16-Channel Digital Input Modules

The following pintout diagram applies to the SNAP-IDC-16, SNAP-IAC-16 and SNAP-IAC-A-16 modules

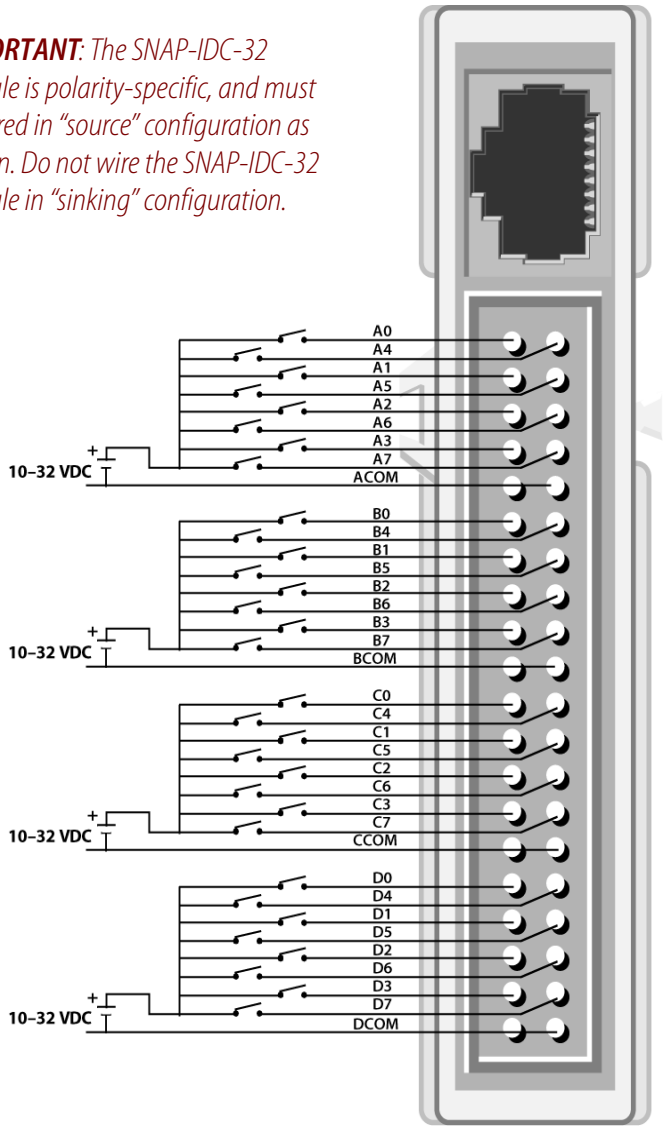


NOTE: The connectors on these modules are not polarity-specific. You can connect the positive lead (+) for each channel (or point) to either L1 or L2, and this can vary from point to point on the module.

Pinouts—32-Channel Digital Input Modules

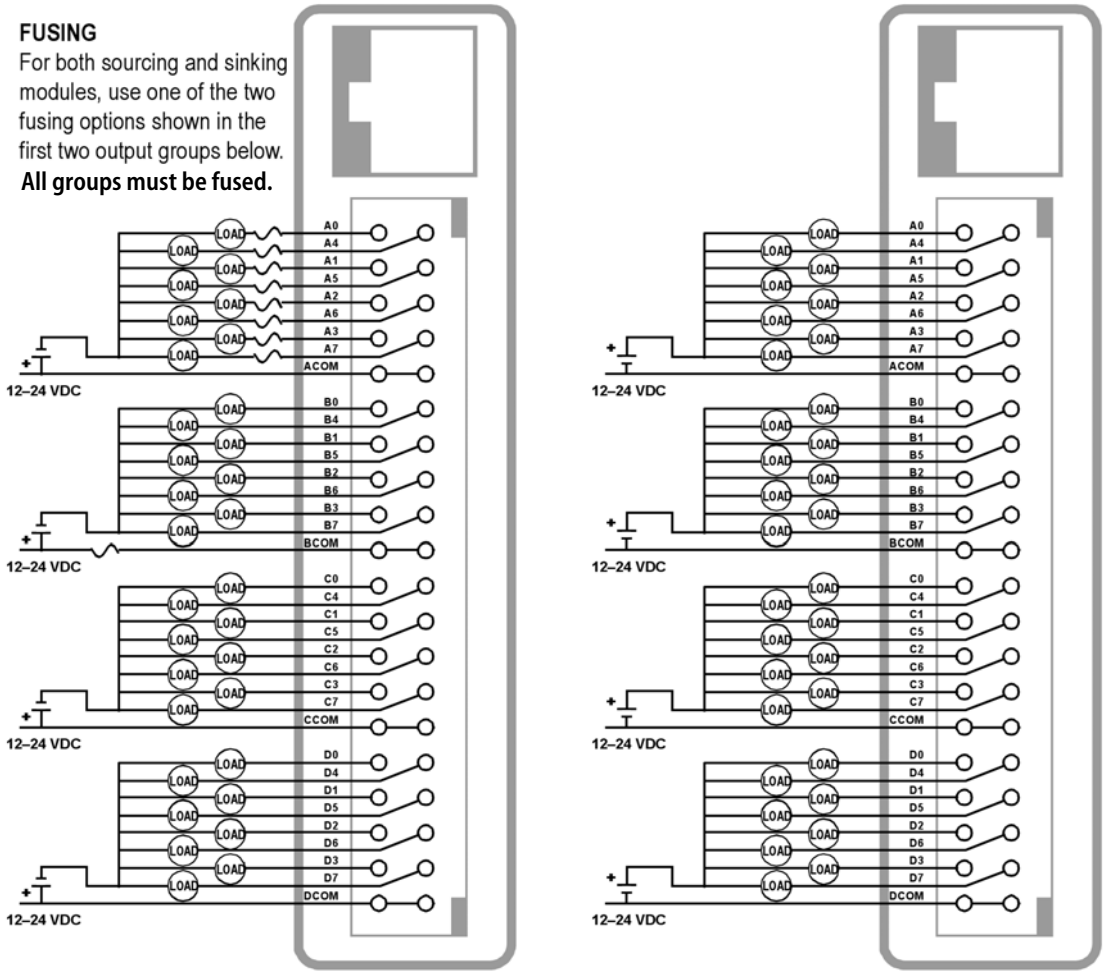
The following pintout diagram applies to the SNAP-IDC-32 module.

***IMPORTANT**: The SNAP-IDC-32 module is polarity-specific, and must be wired in "source" configuration as shown. Do not wire the SNAP-IDC-32 module in "sinking" configuration.*



Pinouts—32-Channel Digital Output Modules

The 32-channel digital output modules include the SNAP-ODC-32-SRC and SNAP-ODC-32-SNK.



SNAP-ODC-32-SRC
Load Sourcing Module

SNAP-ODC-32-SNK
Load Sinking Module

Configuring Breakout Racks

This section describes how to configure a SNAP-IDC-HDB input breakout rack (below) or a SNAP-ODC-HDB breakout rack (see page 12).

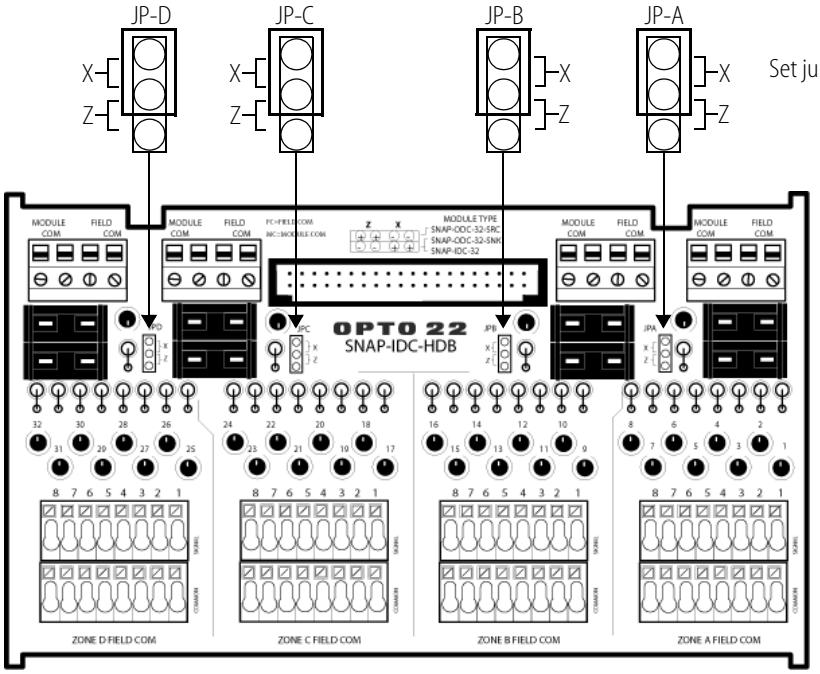
Configuring a SNAP-IDC-HDB Input Breakout Rack

To use a SNAP-IDC-HDB breakout rack with a SNAP-IDC-32 input module, connect the rack to the module using the SNAP-HD-BF6 header cable. Set the jumpers, and wire the field devices and the power supply, as described below.

There are four identical zones on the rack, labeled "A" through "D".

Setting the SNAP-IDC-HDB Jumpers

Set the LED jumpers for the SNAP-IDC-HDB breakout rack to the X position when using the SNAP-IDC-32 input module.

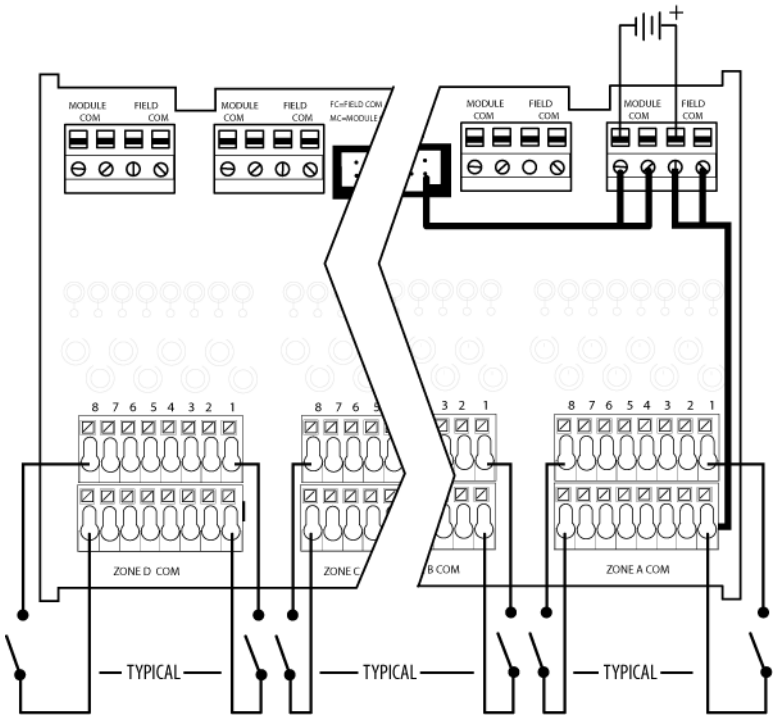


Set jumpers to the X position.

Wiring the SNAP-IDC-HDB

Connect the field devices and power supply to the SNAP-IDC-HDB input breakout board as shown here.

***IMPORTANT**: See module technical specifications for signal voltage range.*



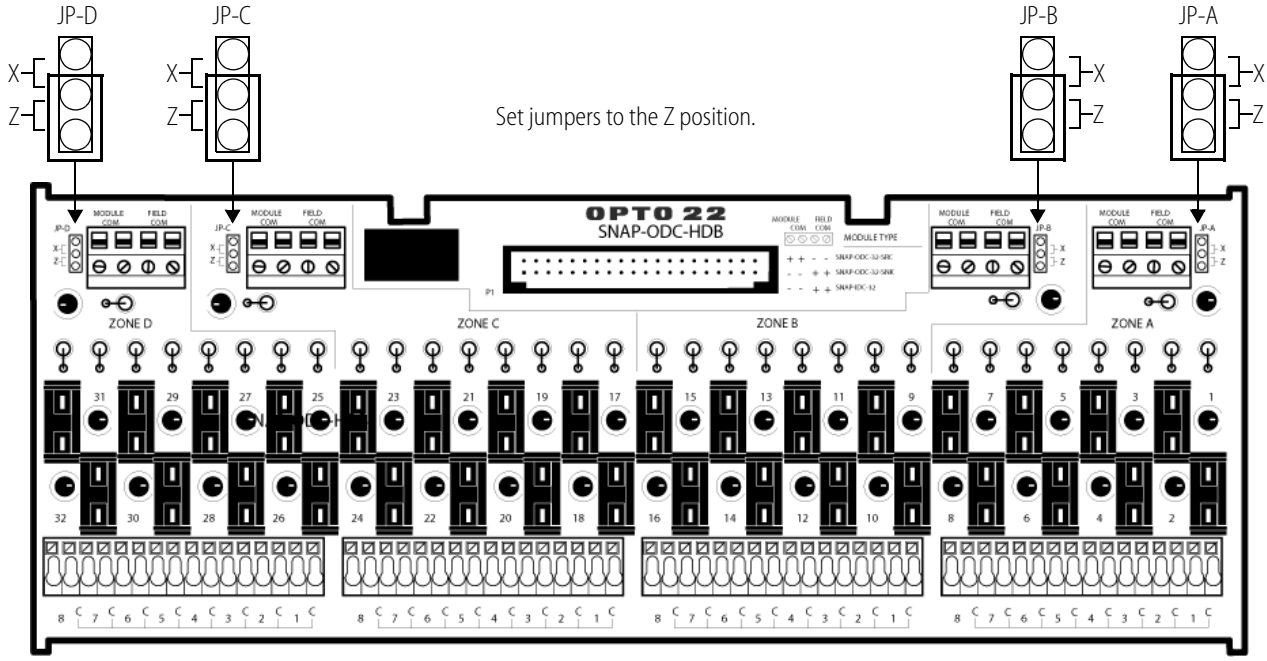
Configuring a SNAP-ODC-HDB Output Breakout Rack

To use a SNAP-ODC-HDB breakout rack with a SNAP-ODC-32-SRC or SNAP-ODC-32-SNK output module, connect the rack to the module using the SNAP-HD-BF6 header cable. Set the jumpers, and wire the power supply and the field devices, as described below.

There are four identical zones on the rack, labeled "A" through "D".

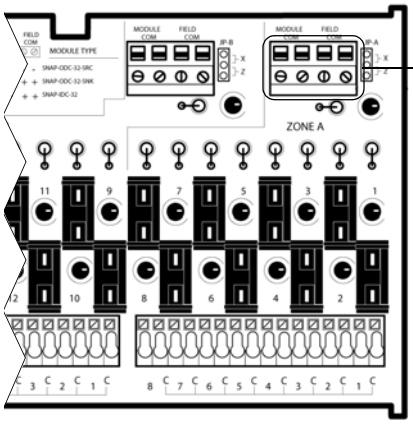
Setting the SNAP-ODC-HDB Jumpers

Set the LED jumpers for the SNAP-ODC-HDB breakout rack to the Z position when using either the SNAP-ODC-32-SRC or SNAP-ODC-32-SNK output module.

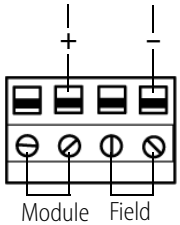


Connecting Power to the SNAP-ODC-HDB

Connect the power supply to the SNAP-ODC-HDB output breakout board as shown here.

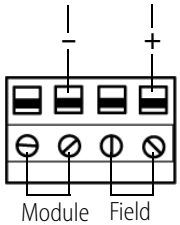


SNAP-ODC-32-SRC



Connect the positive lead (+) from the power supply to one Module COM terminal. Connect the negative lead (–) to one Field COM terminal.

SNAP-ODC-32-SNK

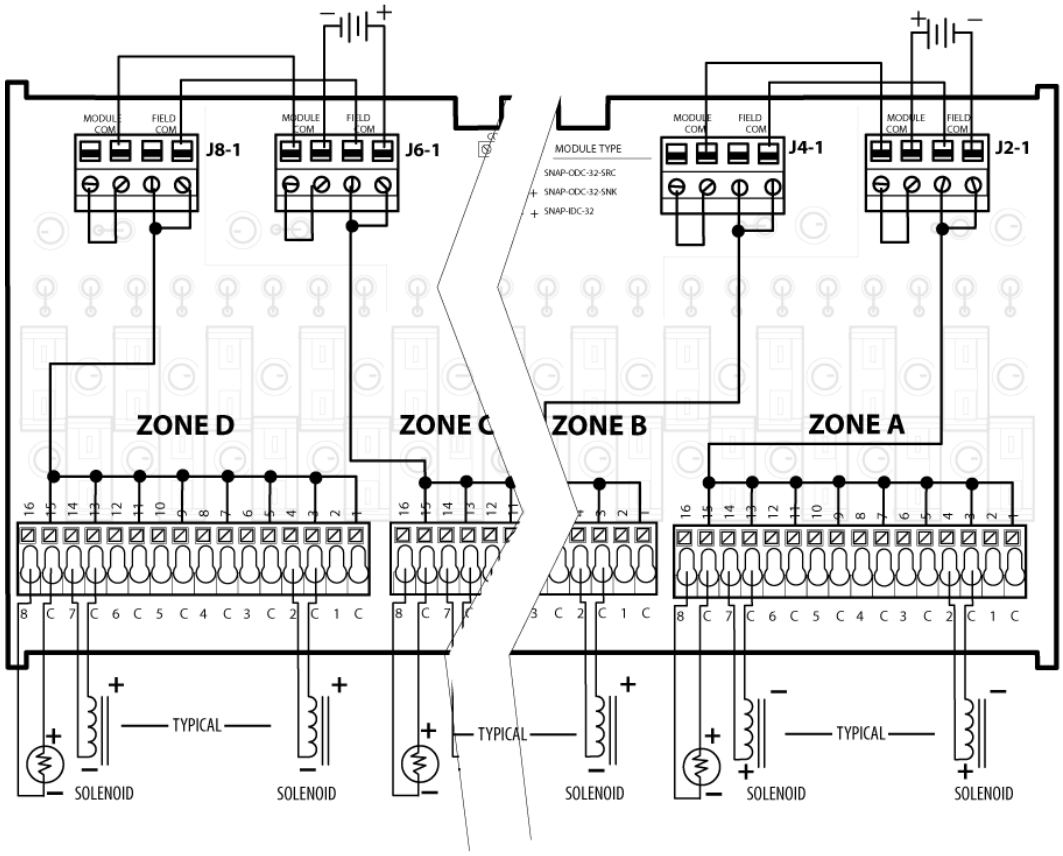


Connect the negative lead (–) from the power supply to one Module COM terminal. Connect the positive lead (+) to one Field COM terminal.

Connecting Field Devices to the SNAP-ODC-HDB

Connect the field devices to the SNAP-ODC-HDB output breakout board as shown here.

***IMPORTANT**: See module technical specifications for signal voltage range.*



Testing Field Connections

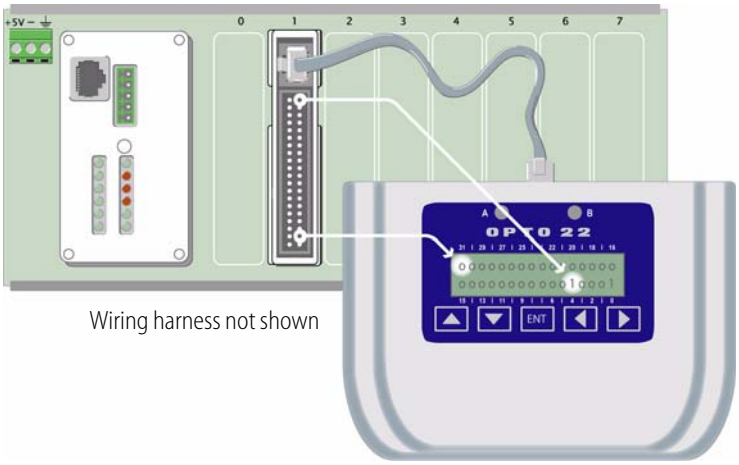
The OptoTerminal-G20 (sold separately) is recommended for testing field wiring locally. For input and output modules, you can use it to read point states; for output modules, you can also use it to write to individual output points.

***CAUTION:** The OptoTerminal-G20 is for use with SNAP high-density modules only, and is the only display device intended for use with these modules. Any use of the display device on other equipment, or the use of another display device with a high-density digital module, may damage your equipment.*

Reading Point States

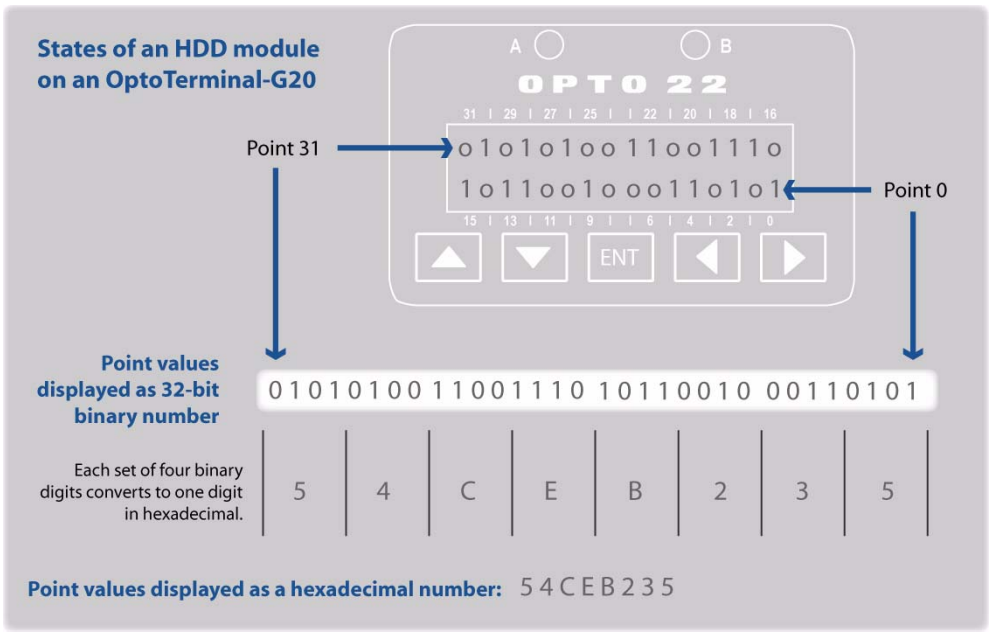
1. Turn on power to the rack.
2. Use the correct cable to connect the OptoTerminal-G20 to the RJ-45 connector on a 32-channel module or the 4-pin connector on a 16-channel module.

As shown in the diagram below, the OptoTerminal-G20 displays the current state of all points on the module.



Point states are displayed as a bitmask. Each binary digit represents the state of one point, either on (1) or off (o). The top row shows points 31–16 and the bottom row shows points 15–0.

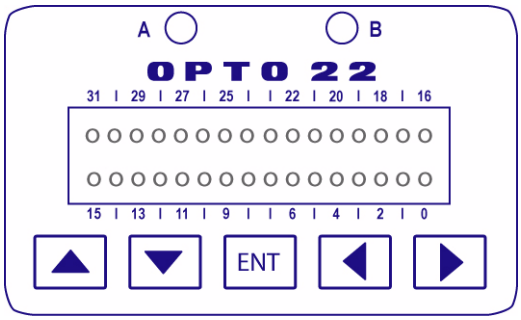
In the following example, points 0, 2, 4, 5, 9, 12, 13, 15, 17, 18, 19, 22, 23, 26, 28, and 30 are on, and the remaining points are off. The terminal displays the bitmask in binary format; the hexadecimal equivalent of the bitmask is shown for reference only.


States of an HDD module on an OptoTerminal-G20
OPTO 22
ENT
Point 31
Point 0
o1o1o1oo11oo111o
1o11oo1ooo11o1o1
Point values displayed as 32-bit binary number
01010100 11001110 10110010 00110101
Each set of four binary digits converts to one digit in hexadecimal.
5 4 C E B 2 3 5
Point values displayed as a hexadecimal number: 54CEB235

Writing to Output Points

1. Turn off power to the rack.
2. Remove the SNAP brain or controller from the rack to prevent it from overwriting commands from the OptoTerminal-G20. (Commands from the display device have the lowest priority.)
3. Turn on power to the rack.
4. Plug the OptoTerminal-G20 into the RJ-45 connector on top of the output module.

   The terminal shows the current state of output points. In this example, all points are off:



5. Press the arrow keys to select the point you want to turn on or off.

Up and down arrows move the cursor between rows.

Left and right arrows move the cursor to select a point.

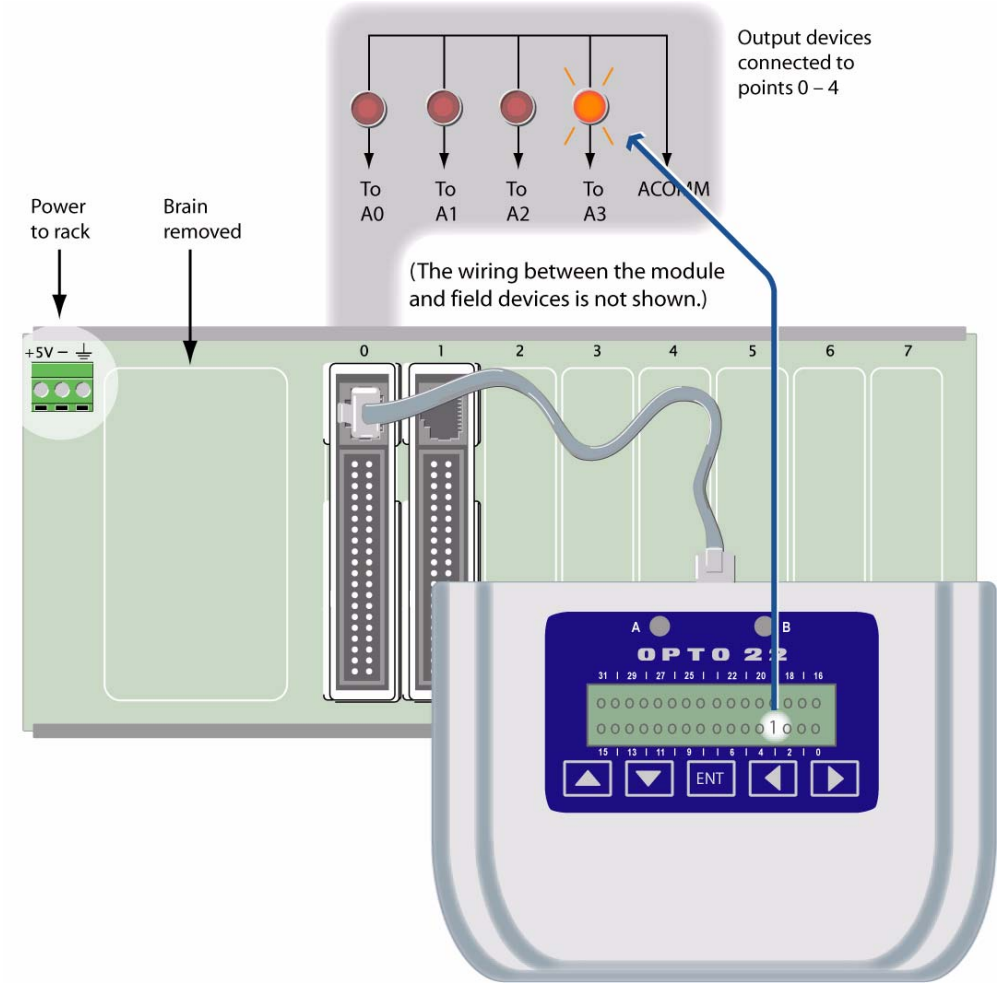
6. When you have selected the point, press ENT.
7. To turn a point on, press the up or down arrow to select a 1. To turn a point off, press the up or down arrow to select a 0.

   NOTE: The OptoTerminal-G20 displays 1 and o for On and Off. A zero is displayed when the value of zero is selected to be written to a point.

8. Press ENT to send the Turn On or Turn Off command.

   If you don't press ENT, the unfinished command is cancelled after 10 seconds, and the display is reset.

9. Watch the output device to make sure it responds.



After the command is sent, the display shows the changed value.

What's Next?

Once you have installed and tested the high-density digital module, it is ready for use. Configuration, reading, and writing using PAC Project are similar to 4-channel modules. For differences, see "Comparing High-Density and 4-Channel Digital Modules" on page 20.

You'll find the following guides useful for the information listed. All guides are available on the Opto 22 website, www.opto22.com. The easiest way to locate one is to search on its form number.

For this information	See this guide	Form #
Installing and using the I/O processors (brains and rack-mounted controllers) that support high-density modules	*SNAP PAC Brain User's Guide*	1590
	SNAP PAC R-Series Controller User's Guide	1595
Reading and writing to high-density modules using PAC Control strategies	*PAC Control User's Guide*	1700
	PAC Control Command Reference	1701
	PAC Control Commands Quick Reference	1703
One-time reads and writes to high-density modules	*PAC Manager User's Guide*	1704
Reading and writing to high-density modules using a custom program you develop	*OptoMMP Protocol Guide*	1465

Notes on Legacy Hardware and Software

For important information on mixing current and legacy products, see Opto 22 form #1688, the *SNAP PAC System Migration Technical Note*.

Using HDD Modules with Legacy Hardware

Most high-density digital modules can be used only with SNAP PAC brains and R-series controllers. However, the following table lists some HDD modules that can be installed on I/O units using legacy I/O processors and racks:

<table>
<tr><th>These HDD Modules...</th><th>...can be used with these legacy processors*</th><th colspan="2">...on these racks</th></tr>
<tr><td rowspan="2">SNAP-IDC-32
SNAP-ODC-32-SNK
SNAP-ODC-32-SRC</td><td>SNAP-UP1-M64
SNAP-ENET-S64</td><td>SNAP-M16
SNAP-M32</td><td>SNAP-M48
SNAP-M64</td></tr>
<tr><td>SNAP-UP1-ADS
SNAP-B3000-ENET
SNAP-ENET-RTC</td><td>SNAP-B4M
SNAP-B8M
SNAP-B8MC
SNAP-B8MC-P
SNAP-B12M</td><td>SNAP-B12MC
SNAP-B12MC-P
SNAP-B16M
SNAP-B16MC
SNAP-B16MC-P</td></tr>
</table>

*Processors must have firmware 6.1 or higher.

Support for these HDD modules on legacy hardware is limited. See form #1688, the *SNAP PAC System Migration Technical Note*, for more information.

To check processor firmware and load new firmware if required, follow instructions in the *PAC Manager User's Guide, Legacy Edition* (form #1714).

Note that SNAP high-density modules cannot be used with digital-only processors, because high-density modules communicate with the processor as an analog or special-purpose module communicates.

HDD modules can be placed anywhere on B-series racks, even in slots marked "Analog Only."

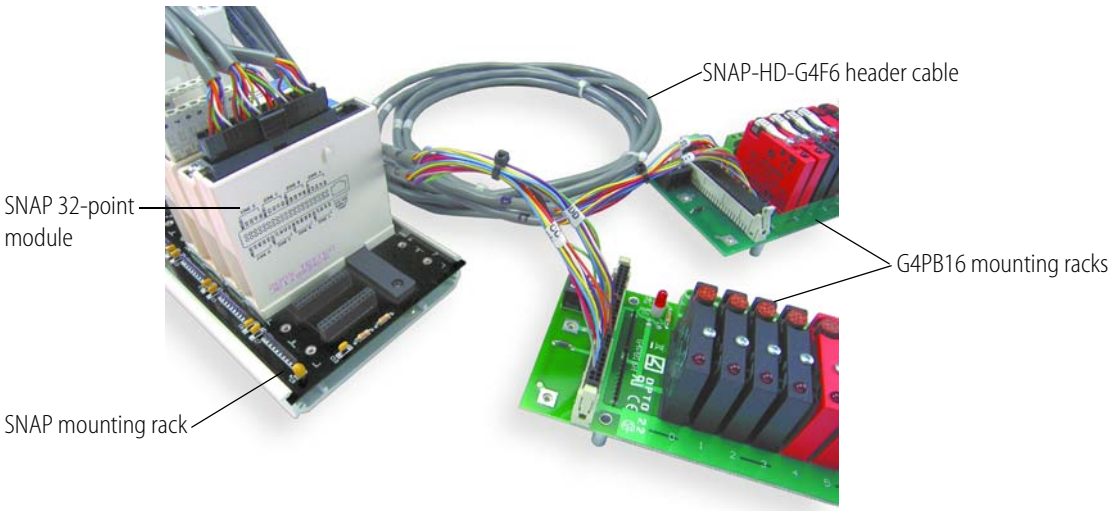
Using HDD Modules with Legacy Software

It is best to use PAC Control 8.0 or newer with HDD modules, because you can configure them as you would other digital modules and read and write to them using standard digital point commands. However, you can use ioControl version 6.1 or newer with the SNAP-IDC-32, SNAP-ODC-32-SNK, and SNAP-ODC-32-SRC modules. Use the separate HDD commands for reading and writing.

Similarly, PAC Manager 8.0 is required for the best use of HDD modules, but you can also use ioManager 6.1 or newer for one-time reads and writes to the same three modules.

If you must read and write to these three modules using ioDisplay 6.0 (not recommended; upgrade to PAC Display or at least to ioDisplay 6.1), see Opto 22 form #1561, *Using ioDisplay 6.0 with SNAP 32-channel Digital Modules Technical Note*.

Connecting to G4 Digital I/O



SNAP high-density digital output modules can connect to G4PB16 mounting racks using the **SNAP-HD-G4F6** header cable. This cable allows older G4 digital output I/O systems to take advantage of modern Opto 22 products like SNAP PAC controllers, SNAP PAC brains, and PAC Project software. The header cable connects two G4PB16, G4PB16H, or G4PB16HC mounting racks to one high-density digital output module.

Comparing High-Density and 4-Channel Digital Modules

SNAP high-density digital modules differ in several ways from 4-channel SNAP digital modules. A few important differences are discussed below; see the table on the next page for more.

Communication with the Processor

One of the main differences between 4-channel and high-density modules is in how the processor (brain or on-the-rack controller) communicates with them on the mounting rack. Four-channel SNAP digital modules communicate with the processor through direct wiring; but SNAP high-density modules communicate as analog and serial modules do, over an internal bus built into the rack and using the processor's analog scanner.

This different communication method means that:

- Communication with the processor (*update time*) is generally slower.
- Communication speed is affected by how "busy" the processor is—that is, how many modules it talks to and how many Ethernet communications the processor is handling at the same time.

Counting

Another difference between 4-channel and high-density digital modules is in counting. For 4-channel SNAP digital input modules, counting is done on the processor. We refer to it as "high-speed" counting because it can be up to 20 KHz, depending on the speed of the module.

For high-density SNAP digital modules, however, the module itself does the counting. The module uses a 16-bit counter (which goes up to 65,535), but the processor used with the module accumulates counts to 32 bits (4,294,967,295) by periodically getting and clearing the module's counts and adding each new count to what it already has for each point. Update time varies based on the number of modules on the rack and Ethernet communication demands placed on the processor.

Counting speed for high-density digital modules is up to 50 Hz at a 50% duty cycle. This rate is useful for applications that require counting at lower speeds—for example, rotating shafts, flow meters that generate pulses, and electrical meters tuned to slower speeds.

Because counting is done in the module rather than in the processor, you can get counts for HDD modules used with SNAP-PAC-R2 controllers and SNAP-PAC-EB2 brains—processors that don't have high-speed counting capability.

Use in PAC Control

SNAP high-density modules are configured and used in PAC Control just like 4-channel digital modules. (Exception: if you are using older hardware, see "Using HDD Modules with Legacy Hardware" on page 19.)

If you want to use a point as a counter, configure it as a counter and use the standard PAC Control commands for counters, such as *Start Counter* and *Get and Clear Counter*. However, because counting is automatic and continuous on the high-density module, be sure you clear the counter each time before starting to use it, so you know it's starting from zero.

High-Density and 4-Channel Digital Module Comparison Chart

The following chart summarizes differences between high-density and 4-channel SNAP digital modules.

Item	SNAP High-Density Digital Modules	4-Channel SNAP Digital Modules
Number of points on module	16 or 32, depending on module	4
Isolation and fusing	**16-point input modules:** Each point is optically isolated from other points on the module. **32-point input and output modules:** The module is divided into four groups of eight points. Groups are isolated from each other, but points within a group are not isolated from each other. Groups must be externally fused.	**Input modules:** Each point is optically isolated from other points on the module. **Most output modules:** Points are not isolated from each other. Points share a common fuse. See the *SNAP Digital Ouput Modules Data Sheet* (form #1144) for isolated modules.
Status LEDs	None; use the handheld OptoTerminal-G20 for module diagnostics and commissioning, or for 32-point modules, connect to an optional breakout rack.	One for each point, located on top of module.
Polling time from I/O processor to module[1]	2–30 ms typical[2]	0.5–2 ms typical[2]
Module turn-on/off time[1]	16-point input modules: 15–20 ms 32-point input modules: 6 ms Output modules: 100 microseconds	Varies by module. Examples: • SNAP-IDC5-FAST: 25 microseconds • SNAP-IDC5: 5 ms turn-on, 15 ms turn-off
Latching	Yes	Yes
Counting on digital input modules	Counting occurs on the module.[3] Counting is available with any compatible I/O processor (including SNAP-PAC-R2 and SNAP-PAC-EB2). Counting speeds: On 32-point modules, 0–50 Hz @ 50% duty cycle On 16-point modules, 0–25 Hz @ 50% duty cycle	High-speed counting occurs on the I/O processor (brain or on-the-rack controller) and can be configured for any point. (High-speed counting is available on SNAP-PAC-R1 and SNAP-PAC-EB1 processors.) Counting speed varies based on the processor and the speed of the module. Example: SNAP-PAC-EB1 brain with SNAP-IDC5-FAST: up to 20 KHz

1 Actual turn-on and turn-off times equal the polling time plus the module time.
2 Polling time varies based on the SNAP I/O processor (brain or on-the-rack controller), processor configuration, and Ethernet host communication activity.
3 The high-density digital module uses a 16-bit counter, but the processor used with the module accumulates counts to 32 bits by periodically getting and clearing the module's counts and adding to current values. Update time varies based on number of modules and Ethernet communication demands.

Specifications

Input Modules

	SNAP-IDC-32	SNAP-IDC-16	SNAP-IAC-16	SNAP-IAC-A-16
Input Range	10–32 VDC	10–32 VDC/VAC	90–140 VAC/VDC	180–280 VAC/VDC
Input Resistance	20 K ohms	44 K ohms	300 K ohms	940 K ohms
Logic Voltage and Current	5 VDC ± 0.1 @ 150 mA	5 VDC ± 0.1 @ 150 mA	5 VDC ± 0.1 @ 150 mA	5 VDC ± 0.1 @ 150 mA
Input Arrangement	32 input channels; 4 groups of 8 inputs each (Points in each group share a common negative connection.)	16 isolated input channels	16 isolated input channels	16 isolated input channels
Channel-to-Channel Isolation	No channel-to-channel isolation; 100 V group-to-group isolation	250 V working, 1500 V transient	250 V working, 1500 V transient	250 V working, 1500 V transient
Maximum Number of HDD Modules on One Mounting Rack	16	16	16	16
Indicators	None; use optional OptoTerminal-G20 diagnostic display or breakout rack.	None; use optional OptoTerminal-G20 diagnostic display.	None; use optional OptoTerminal-G20 diagnostic display.	None; use optional OptoTerminal-G20 diagnostic display.
ON Voltage	10 VDC @ 0.5 mA	10 VDC @ 0.230 mA	90 VDC @ 0.3 mA	180 VDC @ 0.191 mA
OFF Voltage	3 VDC @ 0.1 mA	3 VDC @ 0.05 mA	40 VDC @ 0.135 mA	40 VDC @ 0.043 mA
Polling time from I/O processor to module[1]	2–30 ms typical[2]	2–30 ms typical[2]	2–30 ms typical[2]	2–30 ms typical[2]
Input Turn-On/Off Time	6 ms	15 ms turn-on time 20 ms turn-off time	15 ms turn-on time 20 ms turn-off time	15 ms turn-on time 20 ms turn-off time
Counting Frequency (DC input)	0–50 Hz @ 50% duty cycle	0–25 Hz @ 50% duty cycle	0–25 Hz @ 50% duty cycle	0–25 Hz @ 50% duty cycle

1 Affects turn-on and turn-off determination
2 Time varies based on the SNAP PAC I/O processor (brain or on-the-rack controller), processor configuration, and Ethernet host communication activity.

Output Modules

	SNAP-ODC-32-SRC	SNAP-ODC-32-SNK
Line Voltage	4–24 VDC	4–24 VDC
Logic Voltage and Current	5 VDC ± 0.1 @ 150 mA	5 VDC ± 0.1 @ 150 mA
Output Arrangement	32 output channels; 4 groups of 8 outputs each. Points in each group share a common positive connection.	32 output channels; 4 groups of 8 outputs each. Points in each group share a common negative connection.
Maximum Number of HDD Modules on One Mounting Rack	16	16
Indicators	None; use optional OptoTerminal-G20 diagnostic display or breakout rack.	None; use optional OptoTerminal-G20 diagnostic display or breakout rack.
Polling time from I/O processor to module[1]	2–30 ms typical[2]	2–30 ms typical[2]
Output Turn-On/Off Time	100 microseconds	100 microseconds
Maximum Load per Point	0.25 A	0.25 A
Forward Drop	0.15 VDC @ 0.25 A	0.15 VDC @ 0.25 A
Maximum Off State Voltage	60 VDC	60 VDC
Reverse Voltage	0.6 VDC	0.6 VDC
Surge (1 sec.)	1 A	1 A

1 Affects turn-on and turn-off determination
2 Time varies based on the SNAP PAC I/O processor (brain or on-the-rack controller), processor configuration, and Ethernet host communication activity.

Breakout Racks

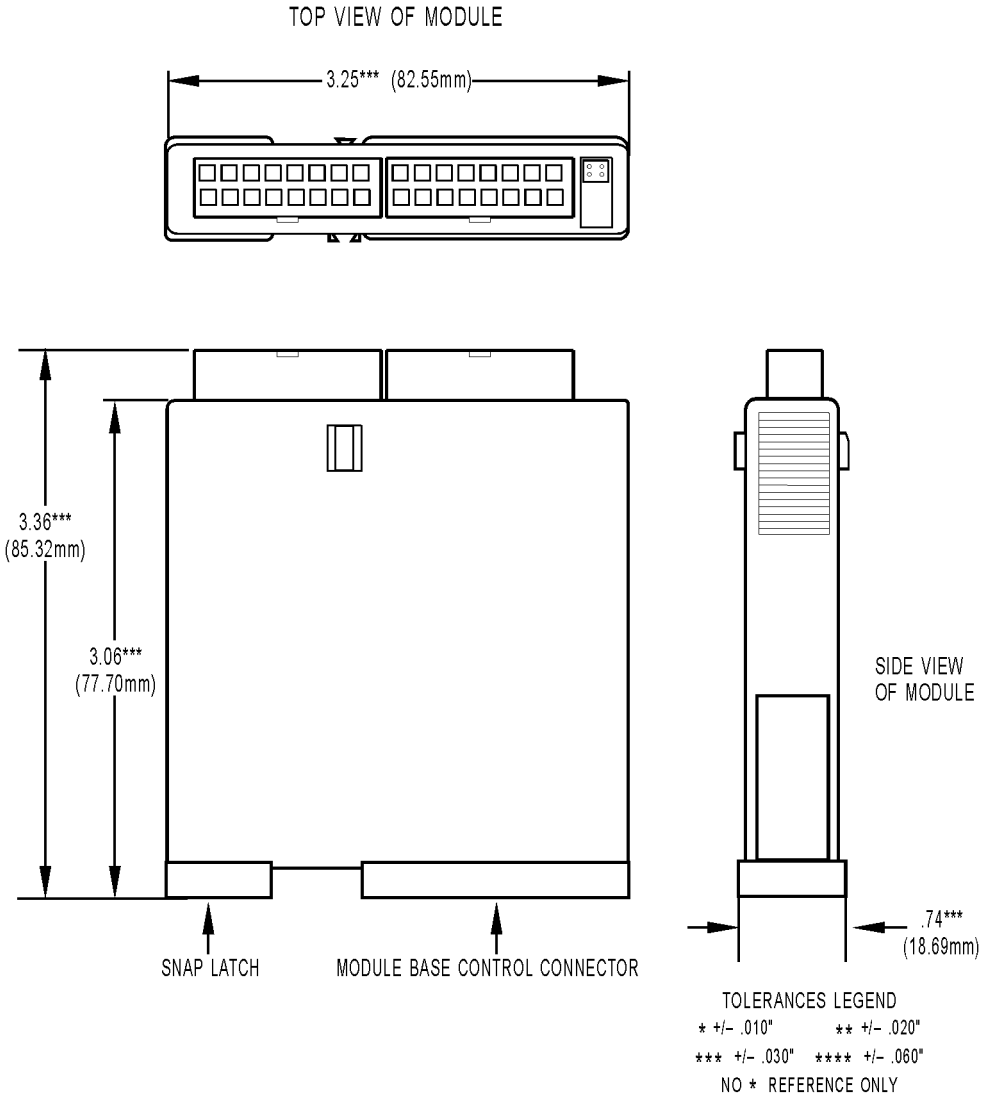
SNAP-IDC-HDB Breakout Rack for High-Density Digital Input Module	
Used with	SNAP-IDC-32
Connectors	40-pin header connects to SNAP-IDC-32 module using SNAP-HD-BF6 header cable. 32 signal input connectors; each signal connector has a corresponding common connector. For each zone of 8 signal inputs, 1 connection for either module common or field common.
Indicators	1 LED for each signal input (32 signal LEDs total) 1 power status LED for each zone of 8 signal inputs (4 power LEDs total)
Fusing	1 A fuses; 2 fuses for each zone of 8 signal inputs (8 fuses total) Replace with Pudenz 1 A automobile mini-fuse or equivalent.
Jumpers	For each zone of 8 signal inputs, 1 jumper controls whether module common or field common is used.
SNAP-ODC-HDB Breakout Rack for High-Density Digital Output Modules	
Used with	SNAP-ODC-32-SRC SNAP-ODC-32-SNK
Connectors	40-pin header; connects to SNAP-ODC-32-SRC or SNAP-ODC-32-SNK module using SNAP-HD-BF6 header cable. 32 signal output connectors; each signal connector has a corresponding common connector. For each zone of 8 signal outputs, 1 connection for either module common or field common.
Indicators	1 LED for each signal output (32 signal LEDs total) 1 power status LED for each zone of 8 signal outputs (4 power LEDs total)
Fusing	1 A fuses; 1 fuse for each signal output (32 signal fuses total) Replace with Pudenz 1 A automobile mini-fuse or equivalent.
Jumpers	For each zone of 8 signal inputs, 1 jumper controls whether module common or field common is used.

Wiring Harnesses and Cables

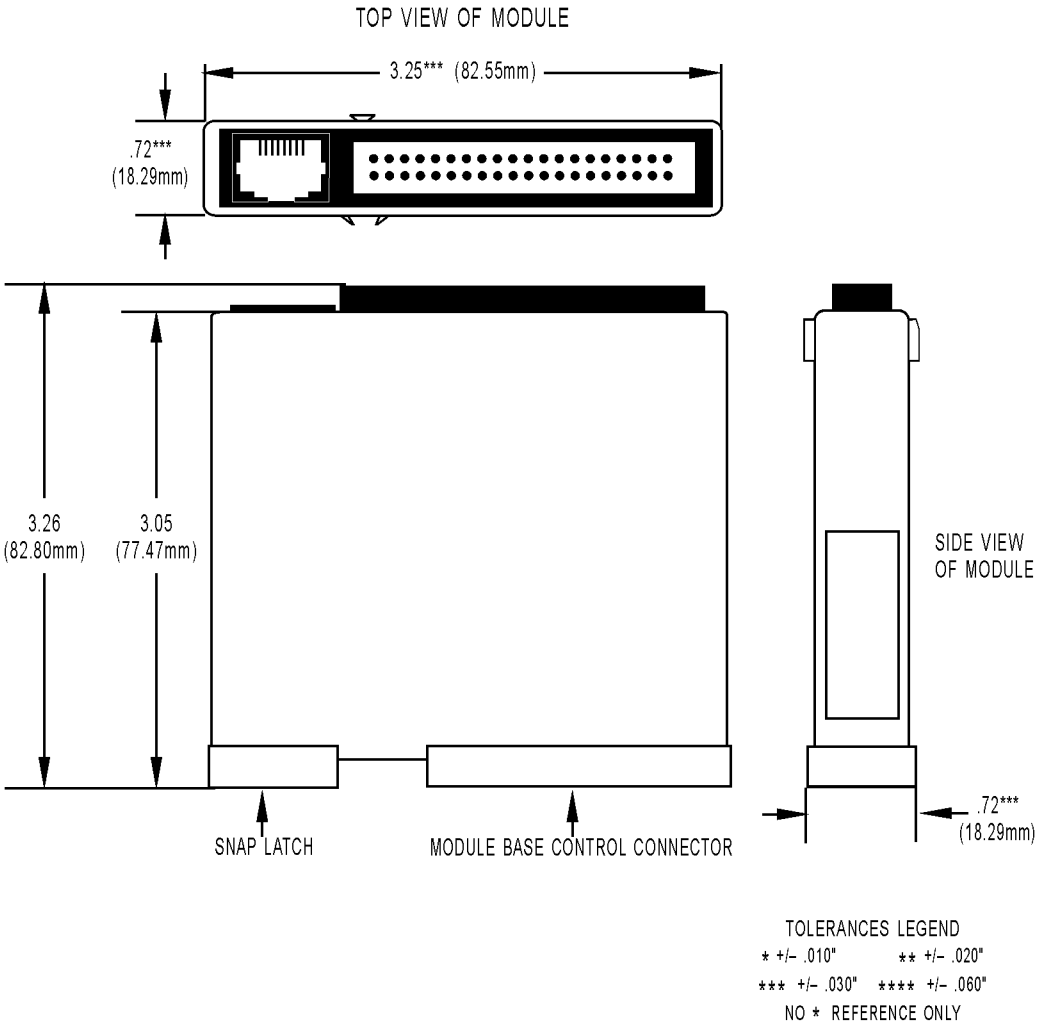
Part	Description
SNAP-HD-ACF6	6 ft. (1.8 m) wiring harness assembly for SNAP 16-point digital modules
SNAP-HD-CBF6	6 ft. (1.8 m) wiring harness for SNAP 32-point digital modules
SNAP-HD-BF6	6 ft. (1.8 m) header cable for SNAP 32-point digital modules and breakout racks
SNAP-HD-G4F6	6 ft. (1.8 m) header cable for SNAP 32-point digital modules and G4PB16 mounting racks

Dimensional Drawings

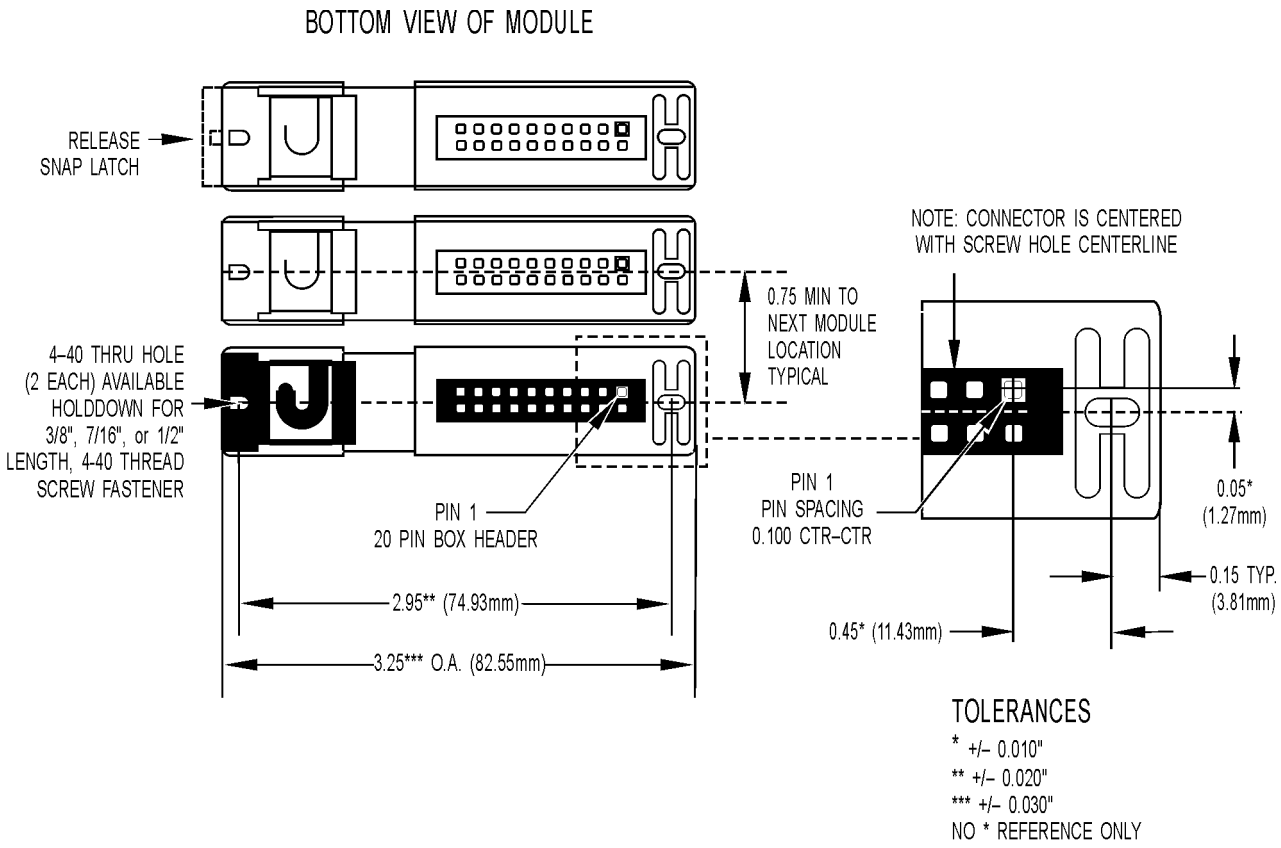
SNAP 16-Channel Digital Modules



SNAP 32-Channel Digital Modules

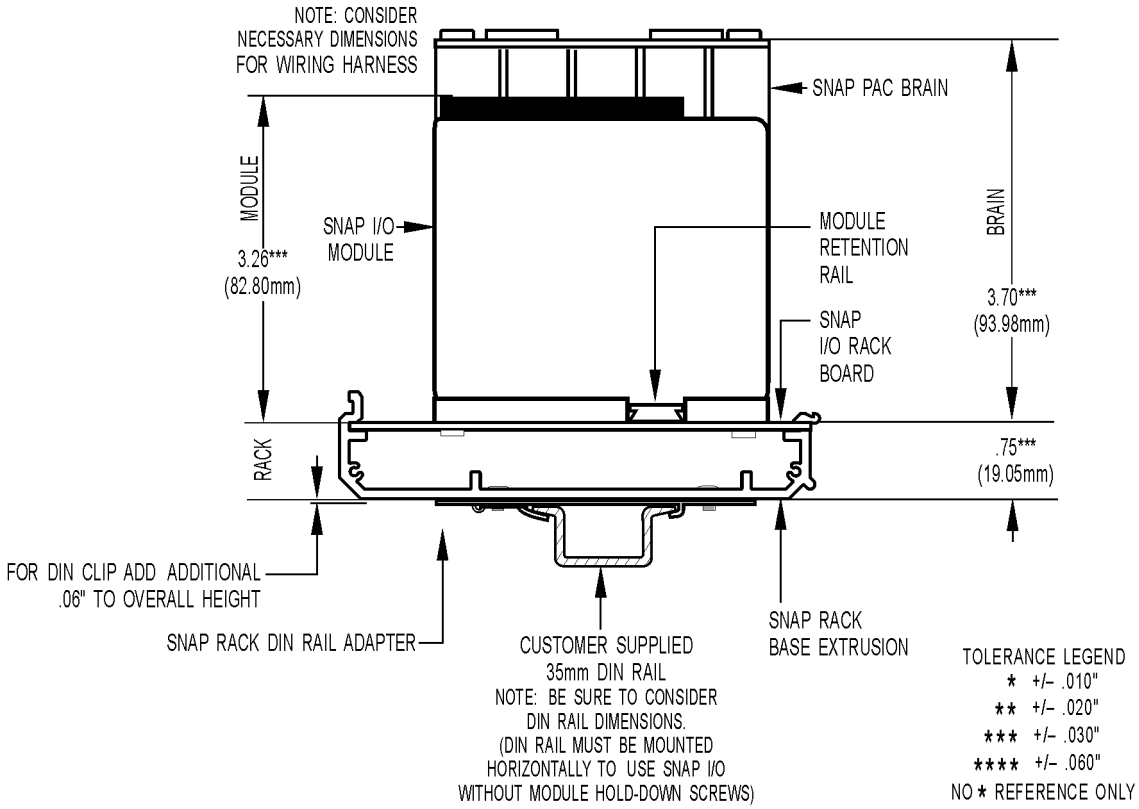


SNAP 32-Channel Digital Modules (continued)

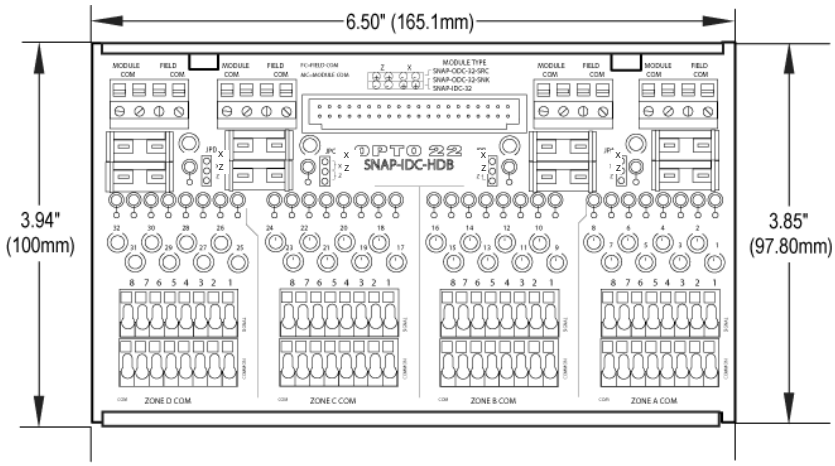


IMPORTANT: The mounting rack connector has 24 pins; the module connector has 20 pins. The extra pins on the mounting rack connector prevent misalignment of the module during installation.

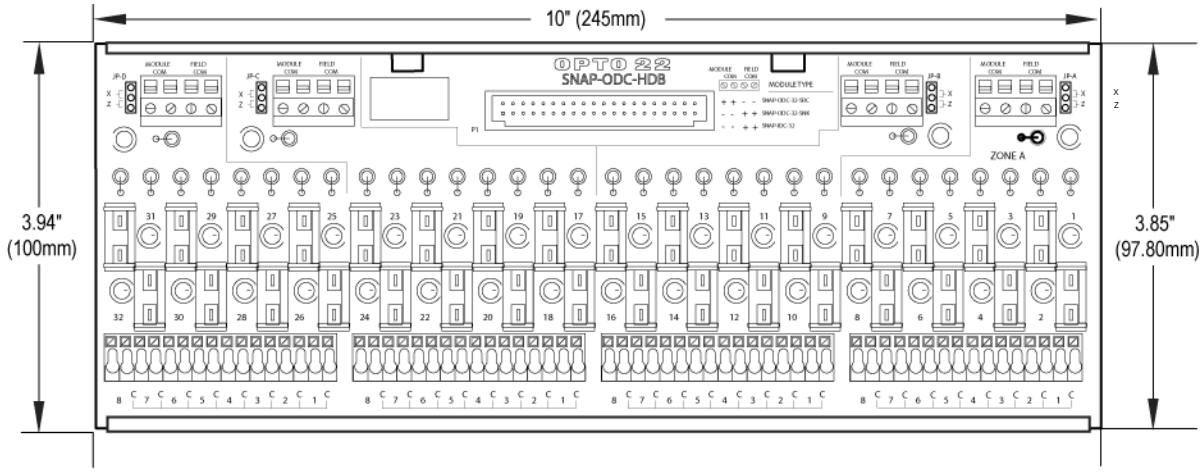
SNAP 32-Channel Digital Modules (continued)



Breakout Racks for 32-Channel Digital Modules



SNAP-IDC-HDB breakout rack



SNAP-ODC-HDB breakout rack